Course Agenda

Water and Wastewater Pumping System Fundamentals

Day 1

08:00 – 9:30 Registration, Student Discussion, Course Overview - *Wruble*

09:30 – 09:45 Break

09:45– 12:00 Pump Fundamentals Part 1 (types, uses, nomenclature installations) - *Rodgers*

Exercise 1: Pump Inspection (impellers, seals, motors) *Rodgers/Wruble*

12:00 – 13:00 Lunch

13:00 – 14:45 Pump Fundamentals Part II (hydraulics, curves, efficiency, affinity laws, application theory) - *Austin*

Exercise 2: Pump Evaluation Exercise, (lift station calibration and pump curve generation) *– Rodgers/Wruble*

14:45 – 15:00 Break

15:00 – 16:30 Piping System Fundamentals and Design (losses, pressures, velocities, surges, air) – *Wruble*

Exercise 3: Pipeline Air, Velocity and Valve Inspection *- Rodgers*

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Day 2

08:00 – 9:15 Electrical Fundamentals (basics, meter use, safety) - *Wruble*

Exercise 4: Meters familiarity exercise including, switch, float and probe testing

09:15 – 10:00 Motors and Testing (types, configurations, single/3 phase, work and HP, efficiency, cycling, problem identification) - *Rodgers*

Exercise 5: Motor demonstration and motor testing

10:00 – 10:15 Break

10:15 – 11:00 Motors and Testing Continued - *Rodgers/Wruble*

Exercise 6: Motor cap troubleshooting exercise

11:00 – 12:00 Pump System Troubleshooting Discussion - *Wruble*

12:00 – 13:00 Lunch

13:00 – 15:00 Pump System Troubleshooting Lab - *Rodgers/Wruble*

Exercise 7: Live system troubleshooting

15:00 – 15:15 Break

15:15 – 17:00 Electrical Control Components - *Wruble*

Exercise 5: Starter and component examination (electromechanical and solid state)

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Day 3

08:00 – 10:00 Ladder diagrams and pump down panel logic - *Wruble*

Exercise 8: Pump-down Panel Construction and Testing

10:00 – 10:15 Break

10:15 – 12:00 Data sensing and other components - *Rodgers*

Exercise 9: **Component Evaluation transformers, relays, etc**
Exercise 10: Pump-up Panel construction

12:00 – 13:00 Lunch

13:00 – 14:15 Programmable Controls (programmable logic controls, soft starters, variable speed drives) - *Wruble*

Exercise 11: VFD demonstration and programming
Exercise 12: Soft Starter demonstration and programming

14:15 – 14:30 Break

14:30– 17:00 Electrical Controls Troubleshooting - *Rodgers/Wruble*

Exercise 13: Electrical Controls Troubleshooting Lab

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Day 4:

08:00 – 09:15 Planning and Pre-design (PDP activities, data gathering, flow estimating, value engineering, community input) - *Matson*

09:15 – 9:25 Break

09:25 – 10:40 Wastewater Pumping (Lift Station) Design - *Heintzman*

10:40 – 10:50 Break

10:50 – 12:00 Energy Efficiency in Pump Design - *Ronimus*

12:00 – 13:00 Lunch

13:00 – 14:30 Individual and Community Water Well Pump Design – *Austin*

14:30 – 14:45 Break

14:45 – 16:30 Booster Pumps and System Modeling – *Hargrove/Fitzgerald*

16:30 – 17:00 Dirty Power Exercise – *Rodgers/Wruble*

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Day 5:

08:00 – 09:00 Designing for the Periphery - *Matson/Rodgers/Wruble*

09:00 – 10:00 Alaska Design and Problem Presentation - *Ronimus*

10:00 – 10:15 Break

10:15 – 11:30 Alaska Design and Problem Presentation - *Ronimus*

11:30 – 12:00 Closeout - *Wruble*

12:00 – Adjourn